A Marshall Cavendish Collection

EVERY FORTNIGHT

# QUEST

## ADVENTURES IN THE WORLD OF SCIENCE

# COMPUTERS 24

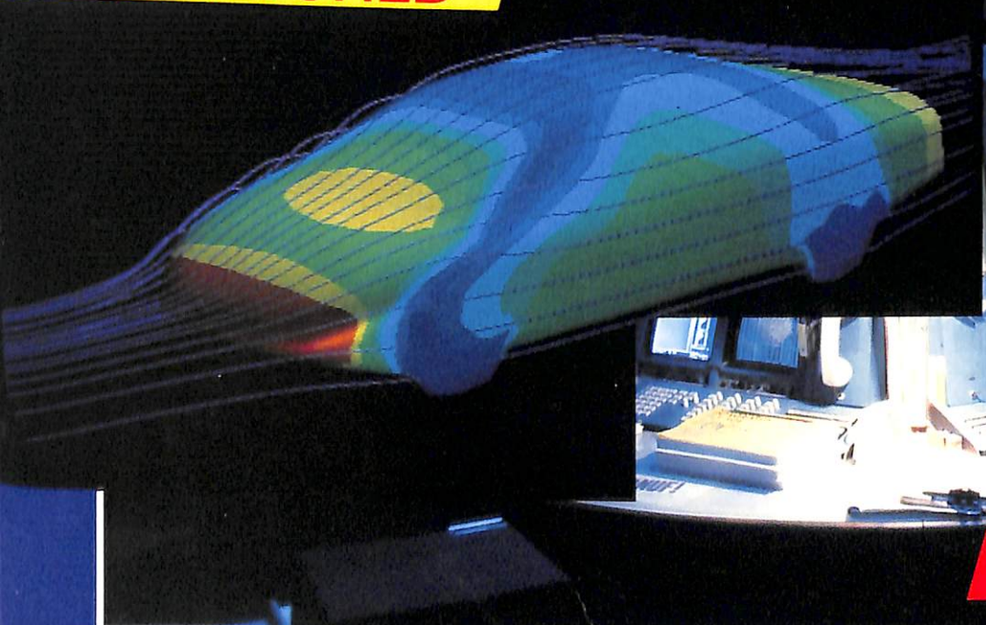
FACT FILES ON:

- Supercomputers
- Biochips
- Robots and androids
- Towards the optical computer
- Automatic navigation systems
- Communication networks

GIANT POSTER

THE CHIP THAT CHANGED THE WORLD

Q&A CARDS



THREE PROJECTS

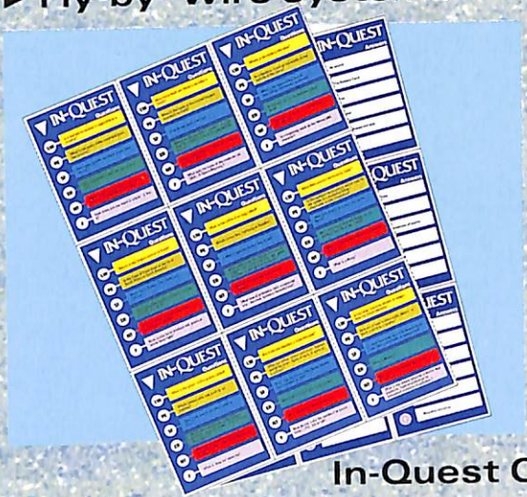
UK £1.99 IR£2.25 Aust $4.95 NZ $5.95 (inc. GST) Malaysia RM5.90 Sing $5.95 Malta Lm1.75 S. Africa R8.95

FULLY SOR

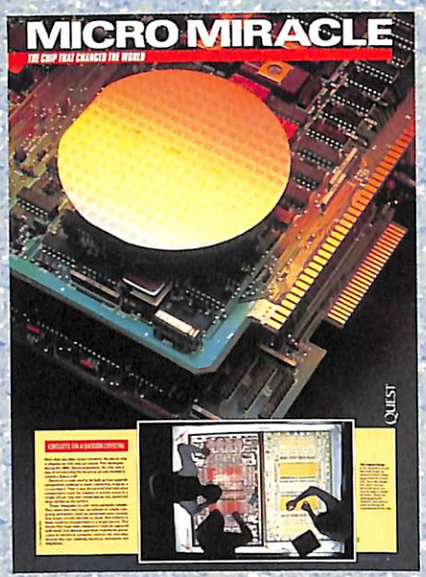
# INSIDE THIS PACK

## FACT FILES

- Hi-tech graphics
- Electronic brains
- Superconductors
- Electronic vandalism
- Bugs and viruses
- Fly-by- wire systems



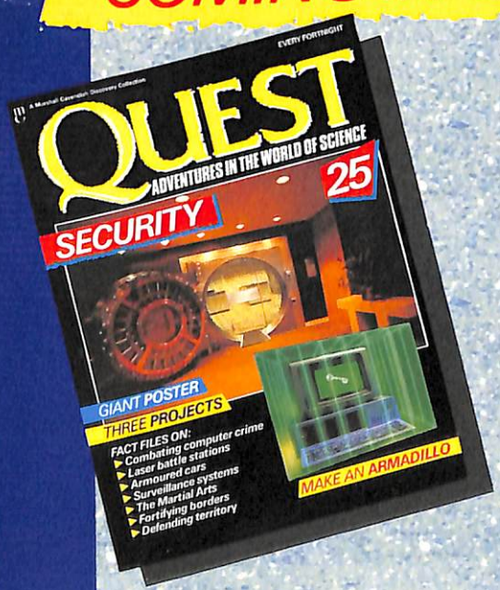

In-Quest Q&A cards




## POSTER
The silicon chip

## SCIENTIFIC PROJECTS

## COMING IN QUEST 25 SECURITY




## FACT FILES INCLUDE:

- Surveillance techniques
- V.I.P. cars
- Radio jamming
- Animal warfare
- Martial Arts
- The sky-spies
- Defending territory

## POSTER
Body armour

## MODEL
Armadillo

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# PROJECTS
# COMPUTERS

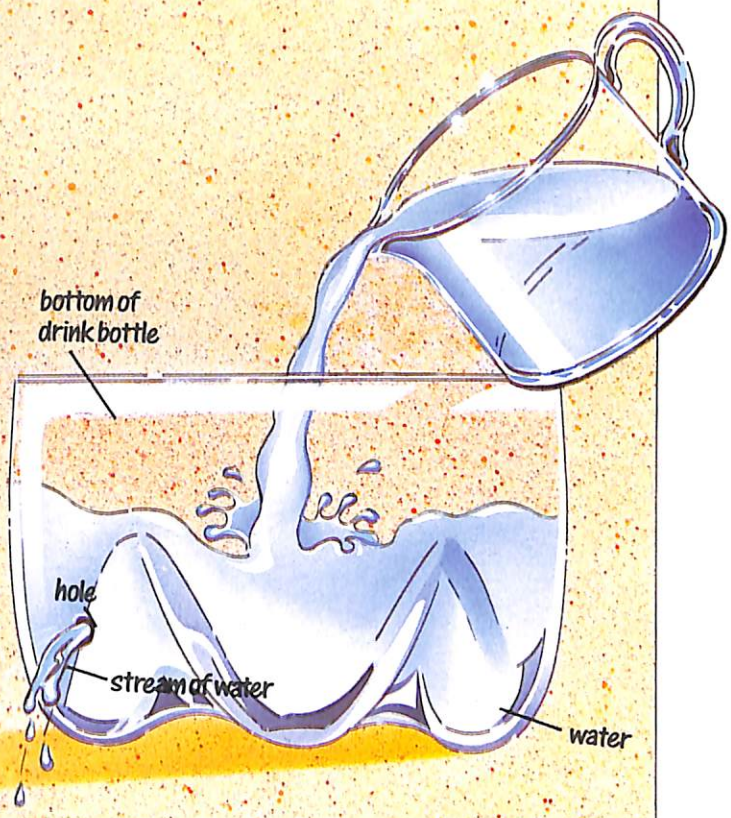
● A buffer memory is a short term storage device for computers. How can you see it working?

## A BUFFER MEMORY

1 2 **3** 4 5

**A computer works much faster than a printer. See how the computer saves data before passing it to the printer.**

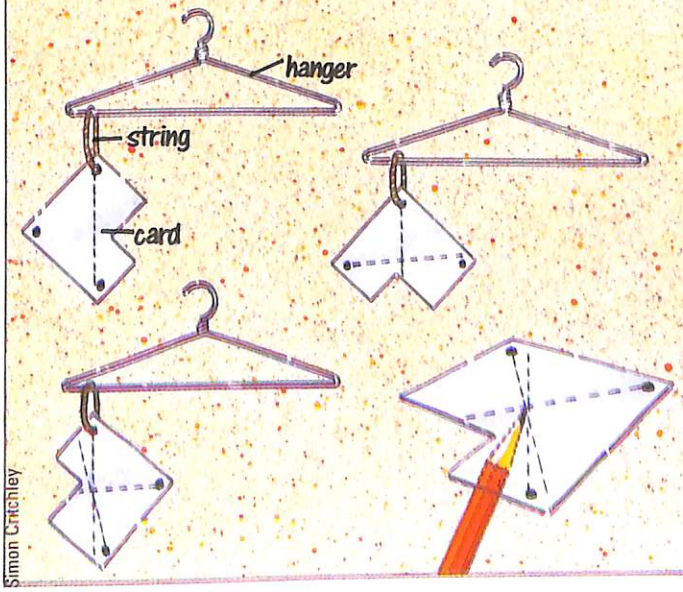
Take a plastic washing-up bottle or a soft-drinks bottle. Use a junior hacksaw to cut the bottle in half. Make a small hole in the side of the bottle near to the bottom with a skewer. Now fill the bottle with water. Watch the difference between the quantity of water you are pouring into the bottle and the amount coming out of the hole. This is how the 'buffer' memory of a computer works – storing data temporarily before passing it on.




## CENTRE OF GRAVITY

1 **2** 3 4 5

You will need a sheet of card, a piece of string, a coat hanger and a pencil. Cut the card into any shape, as irregular as you wish, then poke three holes in it as far away from each other as possible. Put the string through one hole, form it into a loop, and hang it from the coat hanger. Without disturbing the card draw a straight, vertical line on it from the hole to the opposite edge. Repeat with the other two holes. The lines will cross at a single point. This is the centre of gravity. To check this, balance the card on the pencil point.

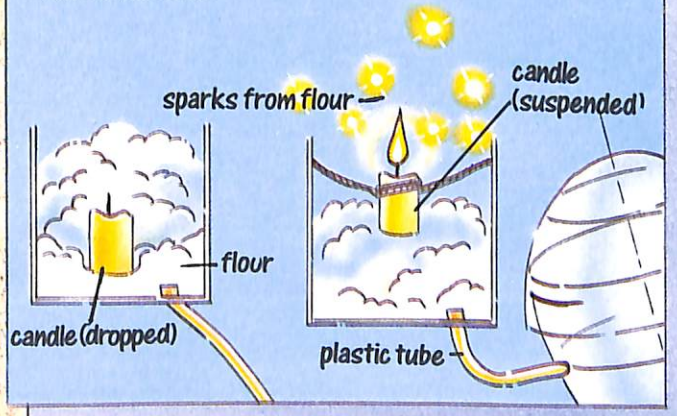



Simon Critchley

## MOLECULES AND ATOMS

1 2 **3** 4 5

Pierce the bottom of a small tin and insert a plastic tube as shown. Suspend a small section of candle across the top and half fill the tin with flour. Light the candle and blow through the plastic tube. A large flame will rise because the molecules of flour are spread out and there is a larger surface area for the flame to react with.




## PROJECT INFORMATION

1 2 **3** 4 5

Each **QUEST** project has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.

**WARNING!**

*Every care has been taken to ensure projects are as safe as possible. However, parents should supervise all projects. The publisher can accept no liability for injury.*

# DATAQUEST

## FARMING: WORLDWIDE AGRICULTURAL PRODUCE

**Top 5 Milk Producers**

| | (tonnes per year) |
|---|---|
| Russia | 78,900,000 |
| USA | 61,553,000 |
| France | 29,012,000 |
| Germany | 17,700,000 |
| UK | 16,720,000 |

**Top 5 Wine Producers**

| | (hectolitres per year) |
|---|---|
| France | 69,000,000 |
| Italy | 60,327,000 |
| Spain | 30,320,000 |
| Russia | 28,000,000 |
| Argentina | 23,302,000 |

**Top 5 Fishing Countries**

| | (tonnes per year) |
|---|---|
| Japan | 12,790,000 |
| Russia | 12,400,000 |
| China | 10,460,000 |
| USA | 5,000,000 |
| Chile | 4,900,000 |

**Top 5 Coffee Producers**

| | (tonnes per year) |
|---|---|
| Brazil | 3,064,000 |
| Columbia | 660,000 |
| Mexico | 421,000 |
| Indonesia | 358,000 |
| Ivory Coast | 187,000 |

## HEALTH & MEDICINE: AVERAGE PERCENTAGE OF ADULT HEIGHT

| Age in years | Boys % | Girls % | Age in years | Boys % | Girls % |
|---|---|---|---|---|---|
| 5 | 61.8 | 66.2 | 11 | 81.1 | 88.4 |
| 6 | 65.2 | 70.3 | 12 | 84.7 | 92.9 |
| 7 | 69.0 | 74.0 | 13 | 87.3 | 96.5 |
| 8 | 72.0 | 77.5 | 14 | 91.5 | 98.3 |
| 9 | 75.0 | 80.7 | 15 | 96.1 | 99.1 |
| 10 | 78.0 | 84.4 | 16 | 98.3 | 99.6 |

So a boy measuring 137 cm on his ninth birthday could expect to be:
137 x 100/75 = 183 cm fully grown.

## COMPUTERS: COMPUTER SPEED

| Unit of time | Part of a second | Interpretation |
|---|---|---|
| Millisecond | One-thousandth | A 152 km/h baseball would travel 50 mm |
| Microsecond | One-millionth | A 160,000 km/h spaceship would travel 50 mm |
| Nanosecond | One-billionth | There are as many nanoseconds in a second as there are seconds in 30 yrs |
| Picosecond | One-trillionth | A picosecond is to a second what a second is to 31,710 yrs |

## COMPUTERS: COMPUTER DEVELOPMENT

Time to execute an instruction in the central procesor

| 1950 | 1960 | 1970 | 1975 | 1980s |
|---|---|---|---|---|
| 300 microseconds | 5 microseconds | 80 nanoseconds | 25 nanoseconds | under 5 nanoseconds |

# MICRO MIRACLE

## THE CHIP THAT CHANGED THE WORLD

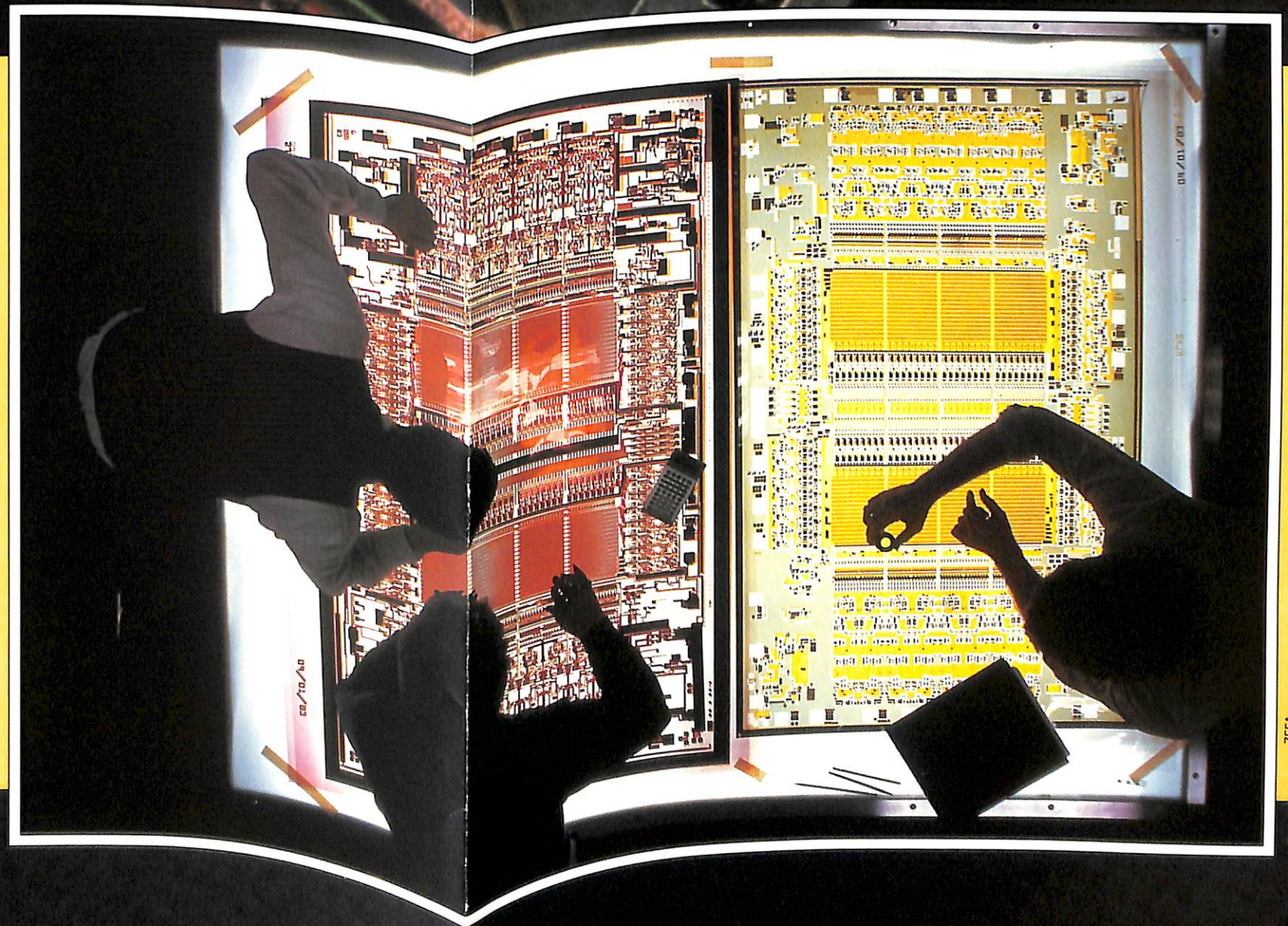
# CIRCUITS ON A SILICON CRYSTAL

More than any other recent invention, the silicon chip is shaping our lives and our futures. First developed during the 1960s' Space programme, the chip was a way of miniaturizing the electrical circuits needed to control a Space craft.

Electrical circuits used to be built up from separate components soldered to metal connecting strips on a circuit board. Then it was discovered that individual components could be created in minute areas of a single silicon chip and connected by tiny aluminium strips etched on the surface.

These 'integrated circuits' were extremely reliable. They were also very fast, so millions of simple computing operations could be performed every second. And single circuits became so small, that millions of them could be incorporated in a single device. This meant that huge slow computers could be replaced with small, fast devices and made it perfectly practicable to introduce computer control into everyday devices like cars, washing machines, televisions and telephones.

Ken Cooper/Image Bank



***The original design*** *of an integrated circuit has to be drawn up several hundred times bigger than the actual chip. Once the design has been checked (pictured here), it is used to make a series of masks. These are photographically reduced and used as patterns during the manufacture of the chip.*

ZEFA

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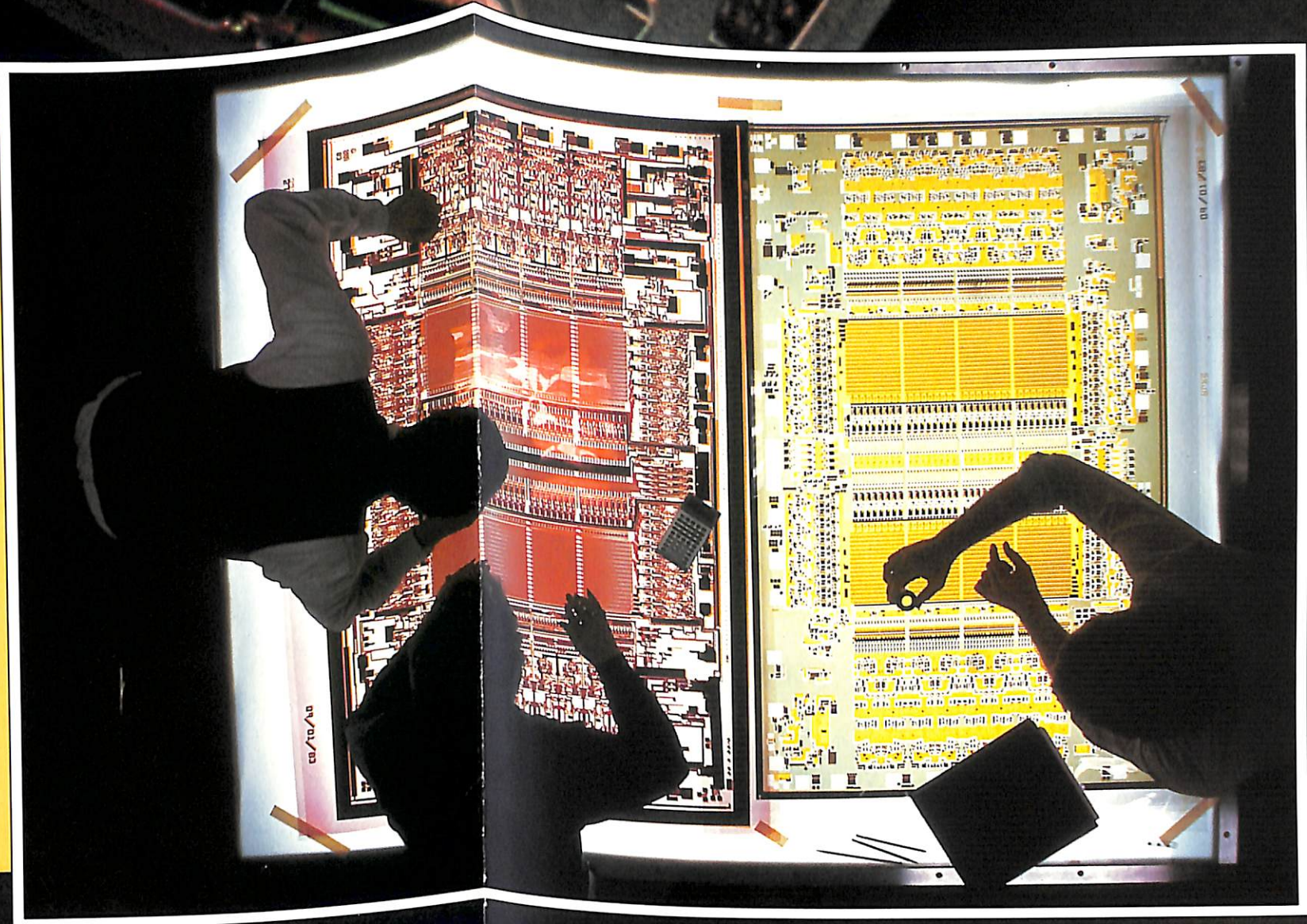

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